Decision (March 2014) 41(1):73–85
DOI 10.1007/s40622-014-0028-2

RESEARCH PAPER

Impact of service quality dimensions in internet banking on customer satisfaction

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Published online: 21 February 2014

Abstract This study explores service quality dimensions in Internet Banking in the State of Kerala (India) and investigates the effect of these dimensions on customer satisfaction. The service quality dimensions identified were Website attributes, Reliability, Responsiveness, Fulfillment, Efficiency, and Privacy and Security. All the dimensions except efficiency and website attribute dimensions were found to influence customer satisfaction. The findings of the study have managerial implications for banks to better promote Internet Banking among their customers by enriching these service quality dimensions. The study calls for the need to exude confidence among the users that their personal information is secured and protected in the bank's website and that their bank will not misuse their personal information. The study highlights the necessity for banks to have a pool of highly responsive bank employees who can respond quickly and professionally to all the requirements and complaints of customers.

Keywords Customer satisfaction · Internet banking · Public key infrastructure · Self-service banking technology · Service quality

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Introduction

The proliferation of technology-based systems has led to a paradigm shift in the way companies interact with their customers. It is, perhaps, the service industry which witnessed a gargantuan transformation to reach out its customers using technology-based systems. In the service industry, it may be the banking sector that made the maximum use of technological advancements by developing a number of alternate delivery channels with a view to attracting tech-savvy customers, improving customers' expectations and ensuring customer loyalty. Extensive use of technology in the banking sector led to the emergence of E-banking. E-banking is becoming immensely popular globally and India is no exception to it. Electronic banking is a construct that consists of several distribution channels (Karjaluoto et al. 2002). It is a process of delivery of banking services and products through electronic channels such as telephone, internet, cell phone etc. (Uppal 2007). Internet Banking is one form of electronic banking. Pikkarainen et al. (2004) defines internet banking as an "Internet portal, through which customers can use different kinds of banking services ranging from bill payment to making investments." Internet Banking is a product of e-commerce in the field of banking. The success of e-commerce business not merely depends on the presence of an attractive website and low price but depends mainly on electronic service quality.

Service quality concept and measurement

There has been continued research on the definition and measurement of service quality concept. Quality represents the degree in which the object (entity) satisfies user's requirements (Batagan et al. 2009). Due to intangible nature of services, quality plays a pivotal role for the success of service industry. Parasuram et al. (1985) defined service quality as the gap between customers' expectations of service and their perception of the service experience. According to Bitner and Hubbert (1994) "service quality is consumers' overall impression of the relative inferiority/superiority of the organization and its services." Service quality resides in the ability of the service provider to satisfy the needs of customers, that is, customer satisfaction (Lewis and Brooms 1983). Service quality can be seen as the extent to which a service meets customers' needs and expectations (Lewis and Mitchell 1994). Traditional service quality refers to the quality of all non-internet-based customer interactions and experiences with companies (Parasuram et al. 1988). The advent of internet paved the way for the emergence of the concept of e-service. E-services have two main characteristics: the service is accessible with electronic networks and the service is consumed by a person via the internet (Batagan et al. 2009). Internet Banking satisfies the above two characteristics, and therefore, service quality in IB denotes e-service quality. Santos (2003) defined e-service quality "as the consumers' overall evaluation and judgment of excellence and quality of e-service offerings in the virtual market place." Parasuraman et al. (2005) defined e-service quality as "the extent to which a website facilitates efficient and effective shopping, purchasing, and delivery."

Two schools of thought concerning the measurement of quality in relation to services are found in the literature. One is the disconfirmation paradigm of performance-minus-expectation and the other is performance-based paradigm of a perception only version service quality. In disconfirmation approach (Gronroos 1984; Parasuram et al. 1985, 1988) service quality is measured on the basis of disconfirmation between consumer expectations and perceptions. The first attempt to conceptualize service quality from the point of view of customers was made by Gronroos and opined that the discrepancy between expectations and perceptions decides the customers' service quality assessment. Parasuram et al. (1988) developed SERVQUAL scale and measure service quality as the difference or disconfirmation between the customers' perception (P) and expectations (E) along 22 variables divided into five dimensions. The problem of measuring expectation was felt by many researchers in the sense that expectations change from time to time, and they were also confronted with the problem of when to measure it, either before or after receiving the service. SERVEQUAL scale as a measure of service quality has been challenged by several researchers (Babakus and Boller 1992; Cronin and Taylor 1992; Brown et al. 1993; Dabholkar et al. 1996).

Babakus and Boller (1992) and Cronin and Taylor (1992) found that perceptions are a superior predictor of service quality than disconfirmation and subsequently Cronin and Taylor (1994) developed SERVPERF (SERVice PERFormance) model to measure service quality based only on customer perceptions. According to this model service quality is evaluated by perceptions of the customers about the performance of the service delivered. SERVPERF assumes that customers provide their ratings by automatically comparing performance perceptions with performance expectations and that measuring expectations directly as done in SERVQUAL is unnecessary. Many researchers (for e.g. Jain and Gupta 2004; Andronikidis and Bellou 2010) proved that SERVPERF is excellent for measuring service quality and customer satisfaction. Therefore, performance-based paradigm is used in this study to measure service quality and customer satisfaction in the internet banking context.

Plenty of research has been carried out on service quality dimensions in traditional "brick and mortar" banking environment (Cowling and Newman 1995) but service quality dimensions in an internet banking environment, where the interaction between customers and bank is impersonal, have not been investigated enough. Based on the conceptual background of the theory of reasoned action (TRA) and the Technology acceptance model (TAM), Loiacono et al. (2000) cited in Sohail and Shaikh (2008) developed WEBQUAL which consists of 12 dimensions for evaluating website quality. But the primary purpose of WEBQUAL was to generate information for website designers rather than to measure service quality from the perspective of customers. Yoo and Donthu (2001) developed SITEQUAL, a nine item scale with four dimensions—ease of use, esthetic design, processing

speed, and security to measure perceived quality of an internet shopping site. The original SERVQUAL scale had been transformed by Jayawardhena (2004) to suit the internet banking context and developed a 21 item scale condensed to five dimensions such as access, website interface, trust, attention, and credibility. Parasuraman et al. (2005) developed E-S-QUAL, a 22 item scale of four dimensions: efficiency, fulfillment, system availability, and privacy for measuring service quality delivered by websites on which customers shop online.

The key service quality dimensions in E-banking/internet banking identified from previous studies include *Responsiveness,* (Jun and Cai 2001; Loonam and O'Loughlin 2008; Sohail and Shaikh 2008; Liao and Cheung 2008; Yu 2008; Santouridis et al. 2009; Khan et al. 2009; Sunayna 2009; Nuseir et al. 2010; Nupur 2010; Kadir et al. 2011; Gupta and Bansal 2012) *Reliability,* (Jun and Cai 2001; Liao and Cheung 2008; Yu 2008; Santouridis et al. 2009; Khan et al. 2009; Sunayna 2009; Nuseir et al. 2010; Nupur 2010; Kadir et al. 2011; Gupta and Bansal 2012) *Efficiency,* (Siu and Mou 2005; Sohail and Shaikh 2008; Quan et al. 2009; Khan et al. 2009; Sunayna 2009; Quan 2010; Gupta and Bansal 2012) *Security,* (Siu and Mou 2005; Loonam and O'Loughlin 2008; Sohail and Shaikh 2008; Liao and Cheung 2008; Yu 2008; Khan et al. 2009; Gupta and Bansal 2012) *Privacy,* (Quan et al. 2009; Khan et al. 2009; Sunayna 2009; Quan 2010; Kadir et al. 2011; Gupta and Bansal 2012), and *Fulfillment* (Sohail and Shaikh 2008; Quan et al. 2009; Khan et al. 2009; Quan 2010). According to Zeithaml et al. (2000) *Responsiveness* indicates the quick response and the ability to get help if there is a problem or question, *Reliability* is the correct technical functioning of the site and the accuracy of service promises, *Efficiency* covers items such as site is simple to use, structured properly and requires minimum of information to be input by the customer. *Security/privacy* refers to the degree to which the customer believes the site is safe from intrusion and protection of personal information. *Fulfillment* is the extent to which the site's promise about order delivery and item availability are fulfilled (Parasuraman et al. 2005).

An exploratory qualitative study with 20 IB users was undertaken to gain insights about the key dimensions of service quality that are important to them. Users agreed that they evaluate the service quality on the basis of above-cited dimensions and in addition, they consider website attributes in terms of attractiveness and help facility to be important. The quality of the website plays a major role in shaping the consumer's web experience (Zeithaml et al. 2002). Based on the review of literature and the qualitative study, 20 items were identified to measure service quality of IB in the State of Kerala and they are exhibited in Table 1. The responses were captured on a five point Likert scale from "Strongly Agree" (5) to "Strongly Disagree" (1).

Service quality and customer satisfaction

Customer satisfaction is a collective outcome of perception, evaluation, and psychological reactions to the consumption experience with a product/service (Yi 1990). In the context of IB, customer satisfaction denotes E-customer satisfaction. E-customer satisfaction is defined as the contentment of the customer with respect to his/her prior purchasing experience with a given electronic commerce firm (Anderson and Srinivasan 2003). Researchers have paid much attention to the close relationships between service quality and customer satisfaction (Parasuram et al. 1988). Cronin and Taylor (1992, p. 65) pointed out that service quality is an antecedent of consumer satisfaction. High perceived service quality results in higher customer satisfaction and vice versa. Empirical studies that examined the relationship between perceived service quality and customer satisfaction have shown that service quality determines customer satisfaction (Bloemer et al. 1998; Wang et al. 2003; Yavas et al. 2004; Arasli et al. 2005; Culiberg and Rojsek 2010). Significant and positive relationship between perceptions of overall service quality and customer satisfaction is found in studies conducted by Siu and Mou 2005; Liao and Cheung 2008; Rod et al. 2009; Quan et al. 2009; Santouridis et al. 2009; Quan 2010; Nuseir et al. 2010; Nupur 2010; Gupta and Bansal 2012).

The perceived performance-based paradigm based on actual performance of a product or service from customer's perspective is used for measuring customer satisfaction as well. According to Churchill (1987), any single item cannot provide a perfect representation of the concept, and therefore, multi-item measures were used to capture customer satisfaction of IB services in Kerala. Following Nuseir et al. (2010) who measured customer satisfaction of e-service quality as

Table 1 Service quality measures used in the study

Item acronym	Service quality measures
SQ1	The web site contains useful help facility (based on qualitative study)
SQ2	Website design is attractive (Zarei 2010)
SQ3	Trust in IB services presented on the bank's website (Nuseir et al. 2010)
SQ4	The bank delivers IB services as promised (Parasuraman et al. 2005; Zarei 2010; Gupta and Bansal 2012)
SQ5	The website is updated continuously (Santos 2003; Nuseir et al. 2010)
SQ6	Bank takes care of IB complaints quickly (Joseph et al. 1999; Sharma et al. 1999; Yang et al. 2004; Parasuraman et al. 2005; Sohail and Shaikh 2008)
SQ7	There is quick response from my bank to customer queries (Culiberg and Rojsek 2010)
SQ8	Web pages load promptly (Sohail and Shaikh 2008)
SQ9	Log into IB website is fast (Khan et al. 2009)
SQ10	The site provides a confirmation of the service requested quickly (Khan et al. 2009)
SQ11	Logout speed of my account is fast (Khan et al. 2009)
SQ12	Finding what I need is easy and simple (Sohail and Shaikh 2008)
SQ13	Easy options for canceling transactions are provided (Sohail and Shaikh 2008)
SQ14	IB website of my bank always satisfy all my service needs (Jun and Cai 2001; Yang et al. 2004)
SQ15	My personal information is secured and protected in my bank's site (Sohail and Shaikh 2008)
SQ16	The bank will not misuse my personal information (Kim and Lim 2001; Yang et al. 2004; Parasuraman et al. 2005; Rod et al. 2009; Zarei 2010)
SQ17	Do not feel safe to use IB* (Parasuraman 2000; Featherman and Pavlou 2003; Yang et al. 2004; Rod et al. 2009; Zarei 2010)
SQ18	Worried that others may access my IB account[a] (Featherman and Pavlou 2003)
SQ19	IB servers may process payments incorrectly[a] (Featherman and Pavlou 2003)
SQ20	Banks give no compensation when errors occur[a] (Bitner 1990; Dabholkar et al. 1996; Featherman and Pavlou 2003; Parasuraman et al. 2005; Ahangar 2011)

[a] Indicates reverse items. Item acronyms are shown in parentheses

a multi-item measure in the context of commercial banks of Jordan, customer satisfaction is measured as a multi-item measure to indicate the degree of customer contentment with regard to various dimensions of internet banking service quality. The level of customer satisfaction in respect of (i) website related to design and ease of use (CS1), (ii) Reliability and confidence in bank (CS2), (iii) Responsiveness of bank (CS3), (iv) Fulfillment of IB services (CS4), (v) Efficiency of IB services (CS5), and (vi) Privacy/Security of IB transactions (CS6) were captured on a five point Likert scale from "Very satisfied" (5) to "Very dissatisfied" (1).

Research gap and objectives

Though there are plenty of literature that explored service quality dimensions and their relationship with customer satisfaction in a traditional "brick and mortar" context, similar studies in an Internet Banking context are scant in the literature and no such study was found to have been undertaken in the State of Kerala in India. It is essential that service providers must understand how the customers evaluate IB service quality for improving service delivery. This study thus aims to fill the void in the literature, and hence the study is quite relevant and timely from the point of view of both academic and banking industry. The study attempts to address the following research question. What are the service quality dimensions in IB and whether these dimensions have effect on customer satisfaction? Based on the above research question, the specific objective of the study was to explore service quality dimensions in Internet Banking and to investigate the effect of these dimensions on customer satisfaction.

Materials and methods

The study is empirical in nature and survey method has been used to collect primary data from 406 IB users from Kerala. The respondents were identified through different stages of selection. In the first stage of sample selection, banks were divided into three strata (categories)—public sector banks (PSB), old private sector banks (OPSB), and new private sector banks (NPSB). The categorization of banks into PSB, OPSB, and NPSB by the RBI for the purpose of assessment of performance of banks is followed in this study. State bank of India, State Bank of Travancore, Canara Bank, and Punjab National Bank were selected from PSB, Federal Bank and South Indian Bank from OPSB, HDFC Bank, ICICI Bank, and Axis Bank from NPSB. These banks were selected because they are in the forefront in harnessing technology and have won accolades for their excellence in banking technology from Institute for Development and Research in Banking Technology (IDBRT) in various years. To accommodate geographical considerations, as the second stage of sample selection, one district each from North Kerala, Central Kerala, and South Kerala was selected. Accordingly North Kerala is represented by Kozhikode, Central Kerala by Ernakulam, and South Kerala by Thiruvanathapuram. These districts were selected due to the maximum number of urban bank branches in their respective region as on March 31, 2009 (RBI 2009). A sampling frame which contains the contact details of IB users could not be obtained from banks because of bank's privacy, topic sensitivity and competition reasons. Therefore, IB users were located from ATM outlets of the selected banks and from the selected districts. The customers who use IB for a period of 1 year or above, visiting ATM outlets on the days of survey were selected to participate in the survey. The questionnaire was piloted on 40 respondents.

Sample profile

Out of 406 respondents, 76 % are male, and 24 % are female. This is in line with the findings of similar studies in India, for example, the studies conducted by Srivastava (2007); Gupta and Islamia (2008); Jamwal and Padha (2009) and Mannan (2010) found that males form the majority of the IB users in India. About 74 % of the respondents are below 35 years of age and 26 % are above 35 years of age. This supports the findings of Ajay and Garima (2008); Jamwal and Padha (2009) those young generations have affinity toward the use of IB. About three-fourth (74 %) of the total respondents are post graduates/professionals and out of the remaining, 22 % are undergraduates and a meager 4 % have plus-two/diploma and below. This indicates that most of the IB users are well-educated banking customers. This corroborates the findings of Srivastava (2007) and Mannan (2010) that educated people constitute the majority of the IB users in India. About 71 % of the respondents are employees, 16 % are self employed professionals like chartered accountants, cost accountants, company secretaries, doctors, lawyers etc., and the rest 13 % are students and businessmen. This corroborates the findings of Mannan (2010) that well to do persons are the major users of IB in Maharashtra, India. Majority (66 %) of the respondents have monthly income ranging from 15,000 to 45,000. This supports the findings of Prasad and Harish (2010) that customers of high-income group are the highest users of IB. To put it succinctly, young males, well-educated employees with a moderately high level of monthly income are the major users of IB in Kerala.

Exploratory factor analysis

Exploratory factor analysis (EFA) using principal component analysis (PCA) under the restriction that the Eigen value of each generated factor is more than one was conducted on 20 service quality measures. The suitability of data for factor analysis was assessed by computing the correlation matrix, and it was found that there is enough correlation between measures. The Kaiser–Meyer–Oklin value reached 0.823, which is considered meritorious according to Kaiser. The significance level of Bartlett's test of sphericity was extremely small (0.000), supporting the factorability of the correlation matrix. The communalities of the 20 measures ranged from 0.570 to 0.830.

As presented in Table 2, PCA revealed the presence of seven components that together explained 70.01 % of the variance. After reducing the data to seven components, Varimax rotation was performed and the rotated factors with their item constituents and factor loadings are given in Table 2. High factor loadings

Table 2 Descriptive statistics and factor extraction results of service quality and customer satisfaction measures

Dimensions	Item acronym	Mean	SD	Factor loadings	Eigen value	Cronbach's alpha
Website attributes	SQ1	3.87	.753	.868	1.09	0.714
	SQ2	3.68	.814	.750		
Reliability	SQ3	3.96	.612	.704	1.50	0.760
	SQ4	3.84	.756	.862		
	SQ5	3.78	.789	.718		
Responsiveness	SQ6	3.48	.894	.819	1.13	0.804
	SQ7	3.52	.930	.846		
Fulfillment	SQ8	3.67	.773	.755	5.83	0.791
	SQ9	3.78	.808	.773		
	SQ10	3.79	.776	.724		
	SQ11	3.96	.746	.664		
Efficiency	SQ12	3.92	.769	.601	1.30	0.731
	SQ13	3.48	.880	.824		
	SQ14	3.67	.858	.726		
Privacy	SQ15	4.00	.718	.816	1.01	0.739
	SQ16	3.93	.779	.837		
Security	SQ17	2.85	1.21	.757	2.11	0.776
	SQ18	3.11	1.19	.785		
	SQ19	3.47	1.20	.806		
	SQ20	3.12	1.19	.665		
Customer satisfaction	CS1	4.15	.681	.618	3.35	0.840
	CS2	4.14	.699	.712		
	CS3	4.30	.643	.791		
	CS4	4.25	.651	.819		
	CS5	4.12	.668	.789		
	CS6	4.06	.751	.738		

indicate that all items load to only one component. Each of the seven factors is suitably labeled based on the characteristics of their composing measures.

Table 3 exhibits the definition of service quality dimensions identified through factor analysis.

The Co-efficient Alpha of reliability was computed for each factor to see each dimension's internal consistency. As shown in Table 2, Cronbach's Co-efficient Alpha (α) for all the factors surpassed the required minimum of 0.70 (Nunnally 1978) and ranges from 0.760 to 0.840 and the alpha co-efficient for all the factors taken together is 0.852. EFA using PCA applied on six measures of customer satisfaction indicated that all the measures were loaded on one and only factor with Eigen value greater than one (KMO = 0.847, $\sim\chi^2 = 905.384$, *df*—15 $p < 0.000$). The communalities of the six measures ranged from 0.544 to 0.671.

Confirmatory factor analysis

The seven dimension model of service quality resulted in EFA is further validated through confirmatory factor analysis (CFA). Besides using the relative/normed Chi square (χ^2/df; df = degrees of freedom) which should not exceed five for models with good fitness (Bentler 1989), the following additional indices from the literature were also considered for assessing the model fit. They are goodness of fit (GFI), adjusted GFI (AGFI), CFI, NFI, and RMSEA. The GFI should exceed 0.90 as recommended by Hair et al. (2010) for a good model. AGFI value greater than 0.80, indicates an acceptable fit to the data (Gefen et al. 2003). A comparative fit index (CFI) value greater than 0.90, indicates an acceptable fit to the data and the normed fit index (NFI) values of 0.90 or greater indicate an adequate model fit (Bentler 1992). Recommendations

Table 3 Definition of service quality dimensions

Dimensions	Definition
Website attributes	It indicates the attractiveness of the website including the provision of help facility to users
Reliability	It comprises of user's trust in IB services, delivery of IB services as promised and updating of websites
Responsiveness	It indicates the ability of banks to provide quick response on customer queries and complaints
Fulfillment	It is the extent to which the website meets the requirements of users in terms of promptness of web page loading, speed of login and logout and confirmation of the requested service
Efficiency	It refers to the ease of using the site and the ability of banks to satisfy the service needs of customers
Privacy	It is the extent to which a user believes that his/her personal information is secured and protected
Security	It is the extent to which a user believes that the website is safe from intrusion and that there is very less chance for monetary loss due to transaction error or server error

as low as 0.80 as a cutoff have been preferred (Hooper et al. 2008 p. 55). According to Hu and Bentler (1999), root mean square error of approximation (RMSEA) must be equal to or less than 0.08 for an adequate model fit. The model fit indices of the 7-dimension model were $\chi^2/df = 2.123$ (χ^2—312.1, *df*—147), GFI = 0.927, AGFI = 0.896, CFI = 0.939, NFI = 0.892, and RMSEA = 0.053. The model fit indices for the 7-factor model indicates that the model fits well in representing the dataset of 20 internet banking service quality measures.

Model estimates

In addition to the model fit indices, standardized regression weights, and critical ratio (CR) estimates were also used to evaluate the 7-dimension model. Besides, the psychometric properties of the model in terms of reliability, convergent validity, and discriminant validity were also evaluated. Reliability and convergent validity of the factors were estimated using composite reliability co-efficient (CRC) and average variance extracted (AVE) which were calculated using the methodologies suggested by Hair et al. (1998).

The following criteria are generally adopted for evaluating CFA models. (1) Standardized regression weights between measures (indicators) and constructs should be greater than 0.50 (Hair et al. 1992). (2) The CR values should be above ±1.96 (Hair et al. 1998) and (3) A minimum cut off criteria for AVE greater than 0.5 and CRC greater than 0.7 (Hair et al. 2006). However, For CRC, values greater than 0.6 are also acceptable (Bagozzi and Yi 1988). The model estimates and psychometric properties of the model are exhibited in Table 4.

As shown in Table 4 all standardized regression weights of indicators (measures) in the model are greater than 0.50, with most of them close to or above 0.70 except SQ 20 which is 0.47. The unStandardized regression weights are significant from the CR test ($CR > \pm 1.96$, $p < 0.05$). The CRC of all the constructs are found above the cut off criteria 0.70 except efficiency construct which is close to 0.70. The AVE of all the constructs is found above the threshold of 0.50 except security and efficiency constructs. As the standardized regression weight of SQ 20 is less than 0.50, it is dropped and the model is re-run. The model fit indices of the final model are $\chi^2/df = 2.145$ (χ^2—278.9, *df*—130), GFI = 0.932, AGFI = 0.900, CFI = 0.942, NFI = 0.898, and RMSEA = 0.054 all of which indicates good model fit. The CRC and AVE are recomputed for the modified model and CRC for security construct remained at 0.75, but AVE improved from 0.44 to 0.51 and it surpassed the threshold of 0.50. The CRC and AVE of all other constructs remained unchanged and though the AVE for efficiency construct is less than 0.50, it is kept in the model due to its content validity.

Convergent validity measures the extent to which the indicators truly represent the intended latent construct. Standardized factor loadings greater than 0.50, CRs higher than 1.96, and AVE close to or above 0.50 indicate convergent validity of the latent constructs used in the model. Fornell and Larcker (1981) present a method for assessing discriminant validity of two or more factors (constructs). According to them AVE for each construct should be greater than its shared variance with any other construct. Shared variance is the square of the correlation between any two factors. Discriminant validity of the constructs is shown in Table 5.

Table 4 Model estimates and psychometric properties of 7-dimension model (service quality)

Constructs	Indicators	SRW	CR	P (Sig. level)	CRC	AVE
Fulfillment	SQ8	0.797	12.081	***	0.80	0.50
	SQ9	0.758	11.745	***		
	SQ10	0.606	9.954	***		
	SQ11	0.640	*			
Security	SQ17	0.597	7.248	***	0.75	0.44
	SQ18	0.823	7.466	***		
	SQ19	0.702	9.048	***		
	SQ20	0.470	*			
Reliability	SQ3	0.689	11.688	***	0.78	0.54
	SQ4	0.800	12.704	***		
	SQ5	0.718	*			
Efficiency	SQ12	0.697	*		0.68	0.43
	SQ13	0.632	9.494	***		
	SQ14	0.614	9.270	***		
Responsiveness	SQ6	0.916	*		0.82	0.69
	SQ7	0.737	11.570	***		
Website attributes	SQ1	0.625	8.149	***	0.71	0.56
	SQ2	0.856	*			
Privacy	SQ15	0.774	*		0.74	0.59
	SQ16	0.764	9.448	***		

SRW standardized regression weight, *CR* critical ratio, *AVE* average variance extracted, *CRC* composite reliability co-efficient

* UnStandardized regression weights assumed as 1

*** Significant at $p < 0.05$ level

Table 5 Discriminant validity of service quality constructs

Constructs	Fulfillment	Security	Reliability	Efficiency	Responsiveness	Website attributes	Privacy
Fulfillment	**0.50**						
Security	0.047	**0.51**					
Reliability	0.287	0.052	**0.54**				
Efficiency	0.425	0.098	0.309	**0.43**			
Responsiveness	0.255	0.013	0.178	0.372	**0.69**		
Website attributes	0.235	0.052	0.298	0.153	0.144	**0.56**	
Privacy	0.212	0.049	0.166	0.326	0.193	0.118	**0.59**

Diagonal values are AVE and off diagonal values are inter-construct squared correlations

It is evident from Table 5 that AVE for each construct is larger than their corresponding squared inter-construct correlations. This indicates high level of discriminant validity of the constructs used in the model. It means that the measured items are more common in associated with the latent construct than with other latent constructs. In summary, the 7-dimension model of service quality demonstrated good model fit, adequate reliability, convergent validity, and discriminant validity.

The customer satisfaction construct is also validated through CFA. Though the model fit indices indicated good model fit, the standardized regression weight of CS5 is 0.46 and for all other measures it is above 0.50. Therefore, CS5 is dropped and the model is re-run. The fit indices of the modified model indicate

Table 6 Results of regression model

Independent Variables	R^2	Beta (β)	*t* value	Sig.
Privacy	.488	.278	6.662	.000
Responsiveness		.260	6.167	.000
Fulfillment		.177	4.024	.000
Security		.181	4.772	.000
Reliability		.163	3.855	.000

Constant 1.490 $t = 9.850$ (Sig = 0.000). Dependent variable: Customer Satisfaction

very good model fit. The χ^2/df (Normed Chi square) χ^2—9.6, *df*—4 is 2.410, GFI—0.991, AGFI—0.964, CFI—0.991, NFI—0.986, and RMSEA—0.060. The unStandardized regression weights are significant from the CR test (CR $> \pm$ 1.96, $p < 0.05$). The CRC of customer satisfaction construct is calculated as 0.82 and AVE 0.49 which is very close to 0.50. In short, the uni-dimensional model of customer satisfaction demonstrated good model fit, adequate reliability, and convergent validity.

Regression analysis

Multiple regression analysis examined the effect of seven dimensions of IB service quality on customer satisfaction. Pursuant to initial regression run, multiple regression assumptions are examined as recommended by Hair et al. (1998). The assumption of normally distributed residual error is examined by Shapiro–Wilk test for the standardized residuals. This test returns a finding of non-significance ($p = 0.069$), which provide evidence that the residual error is normally distributed. Multicollinearity is also analyzed through tolerance and variance inflation factor (VIF). As a rule of thumb, if tolerance is less than 0.20 a problem with multicollinearity is indicated (Garson 2010). Again, a problem of multicollinearity is indicated If VIF is more than five in a regression model. Tolerance values range from 0.710 to 0.953 and VIF values range from 1.049 to 1.408, and therefore, multicollinearity is not found in the analysis. The Durbin–Watson statistic tests for autocorrelation. As a rule of thumb, the value should be between 1.5 and 2.5 to indicate independence of observations (Garson 2010). The value of the test is 1.697 which indicates independence of observations. Other assumptions like linearity, homoscedasticity, absence of outliers are also examined. The regression model is formed using step-wise method. The results of regression model are exhibited in Table 6.

Privacy dimension has the highest beta coefficients followed by Responsiveness, Security, Fulfillment, and Reliability. Out of the predictor variables, the β coefficients of all the dimensions except efficiency and website attributes are found to be statistically significant ($p < 0.05$). Efficiency and Website attribute dimensions are excluded from the step-wise regression model and they are not significant at 5 % significance level (Efficiency $p = 0.056$, Website attribute $p = 0.410$). The findings indicate that service quality dimensions Privacy, Responsiveness, Security, Fulfillment, and Reliability have a positive and significant effect on customer satisfaction and they are the predictors of customer satisfaction.

Discussions and managerial implications

Among the dimensions, Privacy was the one having the strongest impact on customer satisfaction. This calls for the need to exude confidence among the users that their personal information is secured and protected in the bank's website and that their bank will not misuse their personal information. This may be achieved by creating awareness among customers that banks adopt world class technology standards like public key infrastructure (PKI), a security architecture which provides an increased level of confidence for exchanging information over increasingly insecure internet. Responsiveness and Security dimensions also have impact next to privacy dimension. This finding, combined with the fact that customers perceived the measures of Security and Responsiveness dimensions as the lowest amid, the measures of various service quality dimensions, may pose a major threat to the wider embracing of IB in Kerala. Therefore, banks should closely look at how they can improve the perception of IB users regarding the Security and Responsiveness dimensions of service quality. To create a highly responsive bank for IB services, a bank should have accessible and responsive employees who can respond quickly and professionally to all the requirements and complaints of customers. Skilful and experienced staff who can also handle problems associated with the use of IB may be devoted for this purpose. In order to provide hands on training to

potential IB users on how to use IB, banks may arrange live demos at branch offices when the customers approach the banks for IB facility. Though the website of some of the banks provide demos, demos in the presence of experienced bank staff may be more beneficial from the point of view of customers.

The influence of security dimension on customer satisfaction unfolds the need to mitigate user perceptions about risk factors inherent in the use of IB. IB users are prone to "Phishing." It is a method wherein fake e-mails that appear to be from the customer's bank are sent to users asking them to part with sensitive information such as login name and password. Therefore, banks should inform their customers that banks never require their customers to provide their login name and password and this message is shown in the websites of all the banks but it may remain unnoticed by most of the customers. Another form of phishing is that gullible customers are directed to fake websites which look like their bank's real websites. This is done by sending them e-mails which contains the URL of bank's website in the form of hyperlinks. When a customer clicks on the hyperlinks they are directed to a fake website and as the user logins, their confidential information would get stolen. Hence customers should be advised not to access their IB account using the website address received through e-mails, not to access IB by copy-pasting the website address of bank from other websites and also not to open e-mails whose origin is unknown. Further, they should be directed only to access their account by directly entering the URL of their bank's website in the address bar. Before entering the username and password they should be advised to confirm that they are interacting with the genuine website. This can be confirmed by ensuring the presence of risk-preventive security features such as VeriSign symbol, Padlock symbol, The letter 's' in the URL and address bar turning green. Verisign symbol is found on the index page of the Internet banking website of banks, which guarantees that users are dealing with a secure website. Padlock symbol on the net banking screen is an indication that the website is legitimate. There is a de facto standard among web browsers to display a "lock" icon somewhere in the window of the browser. Double clicking on it will display the VeriSign certificate authenticating the site. IB users will know that they are at a secured site when they see https:// in the address field on the internet browser. It means that the user name and password typed will be encrypted before sent to bank's server. If the address bar is turning green, it is an indication that it is safe and the site is legitimate. Higher version of web browsers like Microsoft Internet Explorer 7 and above, Firefox 3.03 and above, Opera 9.5, and future versions of these browsers will support extended validation secure socket layer (EV-SSL) feature and trigger the green bar. Hence IB users should be advised to upgrade web browsers regularly.

Phishing can also occur when a user downloads or installs any free software from internet. The software may contain spyware programmes (often known as Trojan horses) that can send confidential information, without getting noticed by the user, to some remote computer as and when the user uses the IB facility. Banks should advise their customers not to download any free software from internet on their computers through which they access their IB account, and moreover, they should be advised to protect their computers by installing anti-virus software and firewalls. There is software known as "Keylogger" which stores the information about the keys pressed and the pages accessed. Public computers which are networked, most of the time, may have this software installed. Whenever a user access IB from networked computers, there is a chance that their confidential information would be stored by "Keylogger" and then it is used for committing fraud. To protect the users, banks such as State Bank group, ICICI bank, South Indian Bank, and Canara Bank have provided "virtual keyboard" on their website. The Virtual Keyboard is an onscreen keyboard which provides a mouse-based alternative, for entering IB username and password, instead of using the actual physical keyboard. The benefit of this security feature will go awry if customers are not aware of the need to use virtual keyboard. In the wake of the above discussions, the need of the hour for banks is to exude confidence in the minds of IB users that IB is safe, provided they understand the security features adopted by banks to protect the interest of their customers and also to take precautions required from their end. Banks are, therefore, recommended to circulate a booklet containing the above-cited security-related information among their customers.

Fulfillment and Reliability dimensions also did have an impact on customer satisfaction. Fulfillment dimension consists of measures pertaining to the

requirements of users in terms of promptness of web page loading, speed of login, logout, and the confirmation of the requested service. All these depend on the download speed of the internet service providers (ISPs) and banks may not have much to contribute for improving the perceptions of users. However, banks should advice their customers to avail internet connection of those ISPs whose download speed is comparatively high. Reliability dimension comprises of users' trust in IB services, delivery of services as promised and updating of IB websites. Rotter (1967) defines trust as "the belief that a party's word or promise is reliable and a party will fulfill his/her obligations in an exchange relationship." A study by Hoffman et al. (1999) focuses on security and privacy as the key drivers of online trust. Yousafzai et al. (2003) conceptualized perceived security and privacy as antecedents to trust in e-banking context. Hence, banks need to focus mainly on security and privacy dimensions and as these improve, trust improves automatically. Impact of reliability dimension on customer satisfaction also calls for the need to match the services delivered with that of the services promised and for maintaining the websites updated with the latest services.

Limitations and directions for further research

The study considered the perceptions of retail banking customers only and the perceptions of wholesale banking customers who use IB were not considered. The study focused on a specific user group, i.e., those user groups who use IB. Therefore, special caution should be taken when extrapolating or generalizing the findings of the study to other user groups, for example, ATM, mobile banking user groups, etc. Further research is expected to authenticate the generalisability of the findings of the study to user groups of other banking technologies. The low R square reported by the current research to predict customer satisfaction represents another limitation. Hence, there is a need to search for additional measures and constructs that will improve predictive power of the model used. The present study was a cross-sectional study in which subjects are contacted at a fixed point in time and relevant information is obtained from them. Additional research efforts are needed to evaluate the validity of the findings of this study by conducting a longitudinal study at some point in future.

Future research may replicate this study with wholesale banking customers to evaluate the validity of the findings of this study. Wholesale banking customers may use IB more frequently, and therefore, to enquire whether their perceptions are similar to those of retail banking customers would be of interest to future researchers. The research did not examine the relationship between customer satisfaction and customer retention. Future research may aim at examining the relationships among overall internet banking service quality, customer satisfaction, and customer retention. These research findings may enlighten IB service providers to increase their profitability by maintaining their existing customer base. Future research can also explore if there are any mediating variables that may affect the relationship between service quality dimensions and customer satisfaction.

Concluding remarks

The study explored the service quality dimensions that are important to IB users in Kerala and found that satisfaction of IB services is dependent on various service quality dimensions such as privacy, responsiveness, security, fulfillment, and reliability. The government and the RBI are taking efforts to bring down the usage of cash in the society by giving more emphasis on information and communication technology (ICT) solutions such as mobile and online banking, core banking, and electronic fund transfers (Press Trust of India 2012, Sept. 13). In such a context banks cannot afford to underestimate the importance of any of the above-mentioned dimensions that affect customer satisfaction and should continuously aim to improve them especially at a time, when the usage of IB services are gaining acceptance among the banking customers in Kerala.

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